Description

Method for updating services in communication networks

5   Communication networks whose components communicate
with one another on a packet-switched basis are
replacing circuit-switching communication networks to
an increasing extent. Such networks are frequently also
referred to as Voice over IP (VoIP for short) networks
10   when the Internet protocol (IP) is used for
interchanging the audio information provided in the
form of data. In this case, the networks may either be
used exclusively for transmitting voice data or else
for transmitting a mixture of voice data and other
15   information.

The interconnected devices arranged in communication
networks are referred to generally as communication
components. When a communication component of this type
20   is used as a terminal, for example as a telephone or a
multimedia terminal, this component is also referred to
as a client component. Other components are not used as
a terminal, but rather provide services in the
communication network. The services may be a gateway
25   functionality, a voicemail server, an address directory
or the like, for example. Such communication components
are also referred to as server components.

Both the client components and the server components
30   normally comprise a piece of computer hardware (for
example a PC) which uses appropriate hardware extensions
and a piece of adapted software to perform appropriate
functionalities and provide services. In this case, the
performance of a communication component is frequently
35   dependent on the presence and release of the installed
software, which means that by updating a piece of
software which has already been installed or by freshly
installing a piece of software which has not been present

to date, it is possible to increase the performance of a
communication component significantly.

A piece of computer hardware may also have more than
5   one software application installed on it, which means
that a single physical component in the network may in
principle   exercise   both   client   and   server
functionalities. Such communication components are also
referred   to   as   servents   in   the   literature,   an
10   artificial word derived from the terms "client" and
"server".

The communication components connect to one another by
interchanging addressed data packets with one another.
15   In this case, each communication component in the
packet-switching communication network has a network
address which is uniquely associated with it. In the
networks which interchange data on the basis of the
Internet protocol (IP networks), this is the IP address
20   and the IP port number, for example. If a communication
component is intended to connect to or interchange data
with another communication component, then it is first
necessary to find out the network address of the other
component. The network addresses are not always
25   permanently   associated   with   the   communication
components over time, but rather may also be allocated
dynamically   in   the   network,   which   means   that
communication components may each have a different
address whenever they have been turned off and turned
30   on again or after predetermined events. For this
reason, at least one network component in the known
packet-switching communication networks is equipped
with an address directory (address database) for all of
the communication components which are available in
35   this network. These server components are normally
referred to as gatekeepers.

Alternatively, data interchange without a central

address database in the manner of a gatekeeper is
known, for example using the "The Gnutella Protocol
Specification V 0.4" method, which communication
components on the Internet can automatically use to find
5   other communication components for file interchange. In this
case, the file and hence data interchange thus takes place
not using a central server component or a "gatekeeper", but
rather directly between the individual components.
Networks which provide direct data interchange between
10   communication components without a superordinate entity
are called peer-to-peer networks. The communication
components which comprise both "client" and "server"
functionalities are the aforementioned "servents".

15   In the peer-to-peer network based on the Gnutella
specification, each communication component (for
example a PC) holds files ready for interchange with
other communication components. In order to be able to
interchange data, the searching communication component
20   requires the network address of the communication
component which holds the sought file ready for
retrieval. To this end, it first of all sends a first
search message, the "ping". Communication components
which receive a "ping" search message respond to the
25   searching communication component using a hit response,
the "pong". This hit response contains the respective
network address of the responding communication
component and the number of files which this
communication component provides for interchange.
30

In the next step, the searching communication component
sends a second search message "Query" to a limited
selection of those communication components which have
responded to the "ping" search message with a "pong".
35   The second search message already contains the file
name of the file which is being sought. If a
communication component receives a second search
message "Query" but does not itself hold the sought

.file ready for interchange, then it forwards this
search message to other communication components in the
network whose addresses it has ascertained, for example
by means of a "ping" method which has already been
5   carried out in the past. If the communication component
can provide the desired file for interchange, however,
then it responds to the second search message "Query"
with a hit response "Query Hit", as a result of which
the searching communication component can initiate the
10 file transfer using commands defined in the Internet
protocol.

The Gnutella method is used when a particular file is
being sought among other communication components. The
15 search method is terminated at the very instant at
which the sought file has been found for the first
time.

While the correct file need only be found once when
20 searching on the basis of the Gnutella method, it is
frequently important in the case of the services in
communication networks to gain access to a plurality
of communication components - providing services of the
same type - in order to be able to choose between them
25 when required.

A further drawback of the known method is that although
useful data can be interchanged between communication
components there is no guarantee that the software used
30 on the communication components is sufficient for
processing the useful data or is sufficiently up-to-
date.

In addition, the known method does not allow the
35 software installed on a communication component to be
modified.

It is an object of the invention to improve the

performance of software-controlled communication components arranged in packet-switching communication networks.

5   The object is achieved by the features of independent patent claim 1 or 5.

The invention is based on a communication network, particularly a packet-switching network, which contains
10   communication components which use and provide services in the communication network, with a plurality of communication components being able to provide an identical - software-controlled - service.

15   In this case, a communication component ascertains the services provided in the communication network by other communication components. In cases in which both communication components provide identical services, the communication components interchange and compare
20   information about the release of the software controlling the services. If the releases are different, a software update is initialized.

If a first communication component needs to activate a
25   particular service in a second communication component but this service cannot be provided by the software on the second communication component, even though the hardware requirements necessary for this service are in place in the second communication component, this
30   service is made available by a software update on the second communication component.

One advantage of the inventive method is that the methods can be implemented with little complexity in
35   already existing systems.

Advantageous refinements of the invention are specified in the subclaims.

By virtue of at least one communication component
providing software in a respective up-to-date release
for retrieval for a plurality of services, it is a
5   simple matter to ensure that the most up-to-date
software version is always present in the entire
communication network. This reduces the administration
complexity for the communication network to a
considerable extent.
10

An exemplary embodiment of the inventive method is
described below with reference to the drawing.

To this end, the single figure shows a schematic
15   illustration of a packet-switching communication
network which is connected to a circuit-switching
communication network.

A packet-switching communication network VoIP contains
20   communication components A1 - A4, B1 - B11 connected to
one another.

The communication components A1 - A4, B3 - B11 are
servents which thus have both client and server
25   functionalities. The communication components B1, B2
are "simple" IP telephones, that is to say
communication components with pure client
functionality.

30   The communication components A1, A4 contain, as a
server functionality, gateways which connect the
packet-switching communication network VoIP to the
circuit-switching communication network ISDN. The
gateways installed on the communication components A1
35   and A4 are situated at various locations and also in
different secondary distribution network areas of the
circuit-switching communication network ISDN. The
gateways permit connections between the communication

components A1 - A4, B1 - B11 in the packet-switching
communication network VoIP and the circuit-switching
communication system S1, S2, to which ISDN terminals
C1 - C3 are connected. They are available as usable
5 resources to all client components in the packet-
switching communication network VoIP and also to the
communication installations S1, S2 in the circuit-
switching communication network ISDN.

10 The gateways installed on the communication components
A1, A4 may be selected and used by the client
components of the communication components B1, B2 and
also by all client components installed in the packet-
switching communication network VoIP on the
15 communication components A1 - A4, B3 - B11 -
predominantly in the form of software applications. To
this end, all communication components A1 - A4,
B3 - B11 have a piece of communication software
installed on them which provides the client
20 functionality.

The communication software is designed such that it
also respectively examines its own communication
component A1 - A4, B3 - B11 to determine which server
25 functionalities can be provided. This is done at least
when the communication software is started for the
first time. This information regarding the server
functionalities is then stored such that it can be
retrieved by the other communication components
30 A1 - A4, B3 - B11 using appropriate search methods.

The text below uses the example of the communication
component A3 to describe the search for services in the
packet-switching communication network VoIP, the
35 selection of one of a plurality of gateways as services
and the use of the selected gateway for the purpose of
a communication connection between the communication
component A3 and the ISDN terminal C1 in the circuit-

switching communication network ISDN.

When the communication component A3 has started and the above-described examination of the dedicated hardware has taken place, the client component of the communication component A3 searches the packet-switching communication network VoIP for other, "adjacent" communication components. To this end, methods defined in the Internet protocol are used which request all components in a network segment to send a response message. This is done by means of a "broadcast", that is to say a message sent to all components which can be reached. In the course of this search, the communication component A3 ascertains and stores the network addresses of the communication components A1 and A2. In the next step, the communication component A3 sends search messages containing the demand for services of a particular type, namely for gateways, to the "adjacent" communication components A1 and A2 found.

The communication component A3 has been preset such that it uses this search method to search only for services of such a type which will probably or empirically be used more frequently. These include gateways which allow connections between the packet-switching communication network VoIP and the circuit-switching communication network ISDN. Other services which are used less often, for example servers for conducting telephone conferences, are sought in the packet-switching communication network VoIP only when the client component installed on the communication component A3 demands the use of such a service.

In this example, the communication software for the communication component A3 in the packet-switching communication network VoIP searches exclusively for gateways, because this is the service type used most

often in this case.

The communication component A2 does not have its own
gateway, which means that it forwards the search query
5   from the communication component A3 to further
communication components A4, B5, B6 itself.

By contrast, the communication component A1 has a
gateway of its own and responds to the search query
10   from the communication component A3 with a positive
response which includes the network address of the
communication component A1 and the access parameters
for the gateway installed thereon. These statements are
stored in a table by the communication component A3.
15

In addition, the communication component A1 forwards
the search message to other communication components
B3, B10, B11 which are known to it.

20   The communication component A4 likewise has a gateway
of its own, which means that it responds to the search
query from the communication component A3, which it has
received via the "detour" through the communication
component A2, in the same way, with the response
25   comprising the network address of the communication
component A4 and the access parameters for the gateway
installed thereon, in a similar manner to the case of
the communication component A1. These statements are
also stored in the table of available gateways by the
30   communication component A3.

The search messages which are forwarded from the
communication component A3 to its adjacent
communication components A1 and A2 and from these in
35   turn to further communication components contain, in a
predefined data field, a number which is reduced by 1
as a counter whenever the search message is forwarded
from one communication component to the next

communication component. As soon as this number has
reached the value 0 as a result of continued forwarding
of the search message, the search message is no longer
transferred   further   in   the   packet-switching
5   communication network VoIP. This prevents the search
message from being forwarded infinitely often. The
start value for this counter is set to be sufficiently
high in the communication component A3, which means
that   a   large   portion   of   the   packet-switching
10   communication   network   VoIP   or   the   entire   packet-
switching communication network VoIP is searched. In
this case, the number has the value 10, for example.

Besides from the communication components A1 and A4,
15   the   communication   component   A3   receives   no   further
responses.

The communication components A1 - A4, B1 - B11 in the
packet-switching communication network VoIP are usually
20   PCs or other data processing devices which obtain their
client and also their server functionality essentially
by virtue of them being installed with an appropriate
piece of software. While alterations are rarely made to
the hardware of the data processing devices following
25   installation, software changes are more frequent. These
software changes are frequently referred to as updates
in the literature.

In the present exemplary embodiment it is assumed that
30   the   two   gateways   installed   on   the   communication
components A1 and A4 use the same hardware, that is to
say have the same ISDN cards for connecting to the
circuit-switching communication network ISDN, but have
different releases (versions) of the installed control
35   software. The reason for this, for example, is that the
communication component A4 was not added to the packet-
switching communication network VoIP until later and
therefore has a newer software version.

In a similar manner to the method described for the communication component A3, the communication component A1 also searches the other communication components A2 to

5   A4, B3 to B11 in the packet-switching communication network VoIP for services when it starts, but also later at regular intervals of time. Within the context of this search, the communication component A1 is notified of the network address of the communication component A4 and of

10   the access parameters of the gateway installed on the communication component A4. The access parameters of the gateway for the communication component A4 also comprise details about the release of the control software used there. The communication software installed on the

15   communication component A1 now establishes that the "gateway" server component located on the communication component A4 is the same service with the same hardware as its own gateway.

20   Subsequently, the communication component A1 compares the releases of the two software versions and establishes that the software version of the "foreign" gateway is more up-to-date. The communication component A1 then prompts a software download for this control

25   software to its own communication component A1. In this case, the control software may be sent to the communication component A1 from the communication component A4 or alternatively from any other communication component providing the control software

30   for the service.

In addition to updating a software version which is already present, the inventive method also permits automatic fresh installation of a piece of software

35   which has not yet been installed on a communication component but is currently required.

In the text below, it is assumed that, by way of

example, the communication component A2 calls the
communication component A3, but the call is not taken
on the communication component A3. The communication
component A2 then attempts to activate the "callback"
5   service, which is known on the communication component
A2, on the communication component A3. The "callback"
service cannot be performed by the communication
component A3, however, since the control software
required for this is not installed on the communication
10   component A3. The communication component A3 then sends
a message containing this information to the
communication component A2 and checks whether the
software required for the desired service can be
obtained from the communication component A2. If so, a
15   check is performed to determine whether the
communication component A3 meets the hardware
requirement for operating this software.

If all these requirements have been met, the software
20   is sent from the communication component A2 to the
communication component A3 and the "callback" service
is activated on the communication component A3.

As an alternative to obtaining the control software
25   from the communication component A2, the control
software for the desired service may also be downloaded
from any other communication component A1, A4,
B3 - B11. Of these communication components A1, A4,
B3 - B11, one may also be used specifically for
30   distributing control software and may provide a
multiplicity of different services with the respective
up-to-date control software for different hardware
platforms.

35   In addition to bringing the software versions into line
during the search for services in the packet-switching
communication network VoIP and the fresh installation
of software on a communication component, the

communication components in the packet-switching
communication network VoIP regularly send special
search messages which, in a similar manner to the
method described, are likewise forwarded from one
5   communication component to the next and which are used
by the communication components for actively searching
the packet-switching communication network VoIP for
suitable newer control software. Such search messages
are also received by communication components on which
10 a special server component is installed, which are
provided for distributing software updates in the
packet-switching communication network VoIP. In this
way, it is possible to provide software updates at any
point in the packet-switching communication network
15 VoIP and to distribute them on the basis of the
"snowball" principle.